PLEASE AMEND THE CLAIMS AS FOLLOWS:

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1. (REWRITTEN) A method of fabricating a semiconductor color imager having a optical structure wherein an overcoat layer is adapted for optimizing long focal length microlens performance in an ordered process sequence comprising:

a semiconductor substrate having a matrix of imaging sensors formed thereon, each imaging sensor having a photosensitive area and a complementary non-photosensitive area, said matrix of imaging sensors being organized in a plurality of subsets;

forming a first matrix of light shields over the non-photosensitive areas of the matrix of imaging sensors;

forming a passivation layer over the matrix of imaging sensors;

forming a first planarization layer over the matrix of imaging sensors;

forming a first patterned color filter layer on the first planarization layer, said patterned color filter layer being registered with the photosensitive areas of a first subset of the matrix of imaging sensors;

forming a second planarizing layer on the first patterned color filter layer;

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forming a third planarizing layer on the second planarizing layer;

patterning a layer of microlens material to form a first matrix of microlenses over the third planarizing layer, said first matrix of microlenses being registered with the photosensitive areas in the matrix of imaging sensors;

forming an overcoat layer over the first matrix of microlenses, said overcoat layer having high transmittance, said overcoat layer providing patterned or uniform optical compensation between the subsets of the matrix of the imaging sensors; whereby the performance of the color imager is optimized.

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2. The method of Claim 1, wherein:
the semiconductor substrate material may be selected from the group consisting of periodic table IV, III-V, II-VI, or other simple or compound semiconductors.

3. (AMENDED ONCE) The method of Claim 1, wherein:
the matrix of imaging sensors comprise CMOS, CCD, or CID semiconductor sensors.

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5. The method of Claim 1, wherein:

the overcoat layer is comprised of a negative type photoresist having refractive index adjusted to match the refractive index of the microlens material, nominally at n = 1.5.

6. (AMENDED ONCE) The method of Claim 1, wherein:

the overcoat layer is comprised of a patterned multilayer stack such that one or more color (interference) filters are thereby integrated with the overcoat material.

7. (REWRITTEN) The method of Claim 1, wherein:

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a layer of microlens material is patterned to form a second matrix of microlenses over the first matrix of microlenses and beneath the overcoat layer, said second matrix of microlenses having a high transmittance undercoat, said second matrix of microlenses being registered with the first matrix of microlenses whereby a compound microlens structure and undercoat/overcoat layers are formed to satisfy optical specification and performance.

8. (AMENDED ONCE) The method of Claim 1, wherein:

the elements of the first matrix of microlenses may be selected from the group consisting of simple hemispherical convex, plano-convex, hemicylindrical, aspheric, holographic, Fresnel, conic sections, or combinations of known lens classes.

9. (REWRITTEN) The method of Claim 1, wherein:

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the microlens layer material is selected from the group of positive or negative conventional photolithographic materials.

10. (REWRITTEN) The method of Claim 1, wherein:

the overcoat layer is exposed to calibrated dosages of ultraviolet or other irradiation to photopolymerize the high transmittance overcoat material whereby the index of refraction, polarizing properties, spectral absorption characteristics are tailored and the overcoat material molecules are cross-linked to provide thickness control .

11. The method of Claim 9, wherein:

the overcoat layer is comprised of a negative type photoresist to serve as a thermal barrier and protective encapsulant for a microlens layer material comprising a positive type photoresist.

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12. (REWRITTEN) The method of Claim 1 wherein:

The overcoat is exposed to a masked pattern of ultraviolet or other irradiation to form a matrix areas within the overcoat with adjusted properties, said masked pattern being registered with one or more subsets of the matrix of the imaging sensors, whereby imaging sensor subset gain-balance and attenuation is provided.

13. (REWRITTEN) The method of Claim 1, wherein:

The microlens focal length and depth of focus is adjusted by controlling the high

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thickness and refractive index in the final fabrication step of the color imager.

14. (AMENDED ONCE) The method of Claim 1, wherein:

The first matrix of microlenses is exposed to ultraviolet or other irradiation, including thermal processes, to further polymerize the microlens layer material to increase the refractive index at a fixed radius of curvature, to tune the focal length of the microlens-overcoat optical structure.

15. The method of Claim 1, wherein:

the overcoat is comprised of a material satisfying at least

the following three requirements:

(1) of index of refraction matched to that of the index of refraction of the microlenses, e.g., n = 1.5,

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(2) thermal resistance >270 degrees Centigrade, 85

(3) transmittance >95%.

18. (NEW) The method of Claim 1 wherein:

A planarized second matrix of light shields is formed upon the first planarization layer and below the first patterned color filter layer said second matrix of light shields being registered with the first matrix of light shields.

19. (NEW) The method of Claim 18 wherein:

A planarized third matrix of light shields is formed on the second planarized

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matrix of light shields and below the first patterned color filter layer, said third matrix of light shields being registered with the first matrix of light shields.

20. (NEW) The method of Claim 1 wherein
a second patterned color filter layer is formed with the second planarizing layer, said patterned color filter layer being registered with the photosensitive areas of a second subset of the matrix of imaging sensors;

21. (NEW) The method of Claim 1 wherein
a third patterned color filter layer is formed with the third planarizing layer , said third patterned color filter layer being registered with the photosensitive areas of a third subset of the matrix of imaging sensors;

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22. (NEW) The method of Claim 1, wherein:
the first matrix of microlenses is exposed to an ultraviolet or other irradiation pattern to further polymerize a subset of the first microlens matrix to increase the refractive index at a fixed radius of curvature, to optically tune a subset of the optical structure.

23. (NEW) The method of Claim 7, wherein:
The elements of the first and second matrix of microlenses may be selected from the group consisting of compound hemispherical convex, plano-convex, hemicylindrical, aspheric, holographic, Fresnel, conic sections, or combinations of known lens classes.